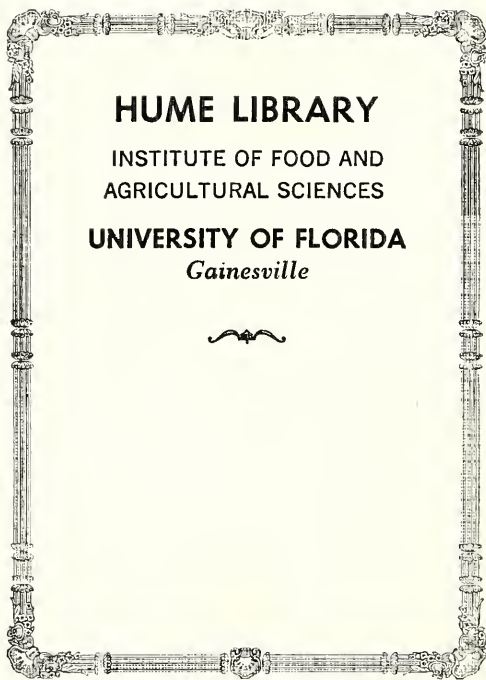


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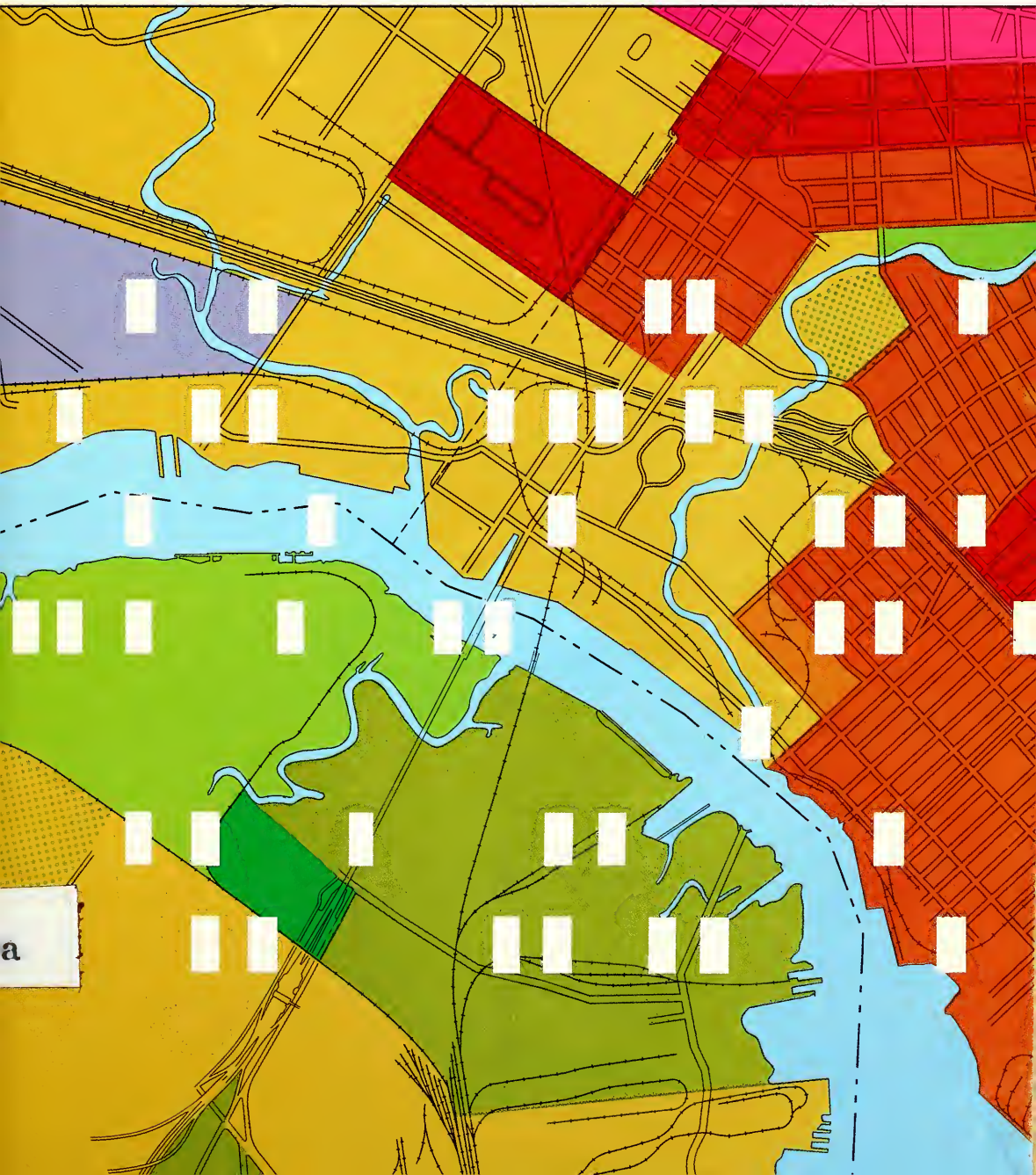


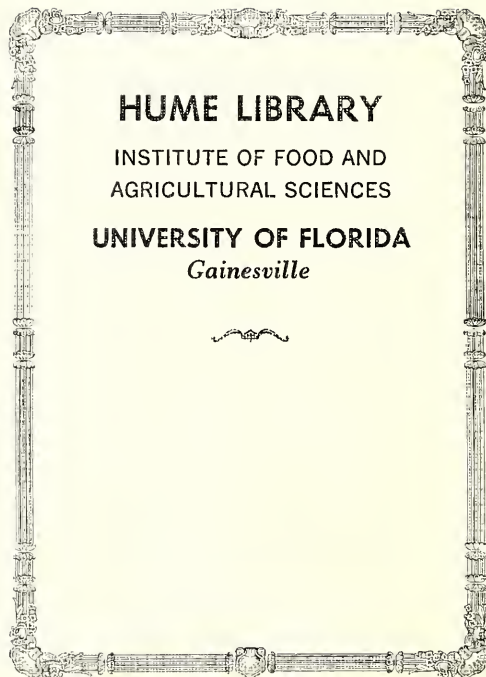
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The Art of Managing the Environment

A FORD FOUNDATION REPORT





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The Art of Managing the Environment

A FORD FOUNDATION REPORT

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One of a series of reports on activities supported by the Ford Foundation.
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THE EXPLOSIVE GROWTH of cities and suburbs in the past twenty-five years has transformed the landscape of American life socially, economically, and politically. In altering patterns of work and residence, the expansion has signalled a new “good life” of consumption and mobility for many. Nevertheless, urban sprawl has exacted huge environmental costs, threatening that good life and calling into question the axiom that rapid growth and development should be encouraged, or at least accepted, as necessary ingredients of progress.

The onslaught of urban sprawl follows a familiar pattern: bulldozers lunge up hillsides, across farm lands, and through woods, kicking up clouds of housing developments, shopping centers, new roads, factories, and office buildings. The environmental results are also familiar: a heavy drain on existing water and power supplies; soil erosion and runoff contaminating rivers and streams; overloaded sewers; proliferation of septic tanks, often poorly designed and constructed; replacement of natural protective ground cover by paved surfaces and buildings, increasing the risks of floods; accumulation of solid wastes and conversion of land into dumps with attendant health hazards and aesthetic pollution; traffic congestion and consequent air pollution; and a rapid increase in population, putting demands on the public services of nearby older cities and towns beyond their capacity to deliver.

As the hidden costs of urban sprawl became visible, laws were passed to meet specific environmental threats. The large body of legislation enacted in the 1960s sought to correct existing pollution and build safeguards against future damage to the nation's resources of land, air, and water. For the most part, however, the new laws attacked environmental problems piecemeal. Nearly every level of government operated separate agencies to deal with air and water pollution, the disposal of solid waste, the protection of land and wildlife, and the treatment of sewage. There was little recognition that these functions are interrelated and interdependent. Without prior coordination, remedial measures applied to one problem in isolation can cause equally serious new problems in other areas—when a city burns garbage, it also pollutes the air.

In any case the new laws did not halt mushrooming development, although they occasionally gave aroused citizens the means to slow it down in the courts. The phenomenon proved too power-

ful to give way to sporadic attempts to combat particular abuses or to preserve an area from conversion into an airport, shopping center, or housing subdivision. What increasingly seemed necessary was a comprehensive program that would enforce environmental laws, coordinate the management of agencies charged with avoiding or controlling pollution, and plan for future development with an eye to its environmental effects as well as economic and social costs and benefits. Such a combination of enforcement, management, and planning obviously can only be undertaken by government.

The notion that "the environment," broadly speaking, is government business is not new. In one form or another various levels of government have assumed responsibility for national or state lands, waterways, public health, and more recently the quality of air. Government planning is also a generally accepted necessity in such areas as highways and budgets. What is new—and still very much in the experimental stage—is the idea of trying to integrate various government departments dealing with the environment into a single management system and to include environmental considerations in land-use planning and development. The planning aspect especially strikes some people as a threat to deeply held American convictions about the rights of private property and individual enterprise.

Nevertheless, with the growth of the "environmental movement," citizens began to put pressure on government to do something about abuses and protect communities from future environmental hazards.

In 1970, the Ford Foundation, which has had a program in Resources and the Environment since 1966 and an active concern for conserving natural resources dating to the early 1950s, began focusing on the practical aspects of environmental management by government. Research and training of ecological scientists were being supported by government, foundations, and other institutions, but there were few means by which the knowledge gained could be applied in a setting sufficiently broad to make a difference.

The logical place for such application seemed state and local governments, which are closest to the problems and under the greatest pressure to do something about them. The Foundation therefore surveyed the environmental management capabilities of

about fifty metropolitan areas to see whether a private foundation could provide assistance toward improved environmental management in a few experimental areas. Outside funding was necessary to give mayors, county commissioners, and department heads some financial leeway in getting an environmental management experiment started. Most cities and counties operate within established administrative structures tightly controlled through line-item budgets, and have neither the time nor the resources to take the long view. Their decision-making tends to move from crisis to crisis, often resulting in conflicting policies.

It was apparent, too, that environmental problems are regional, and local government structures are not. To preserve an estuary, the watershed that feeds it must be controlled. Without a management system that cuts across many jurisdictions a resource can be nibbled to death by zoning variances, sewage discharge permits, or subdivision approvals granted by one local government or another without any comprehensive view of the final result. And the existing system is usually too complex to be adequately monitored by news media or citizen groups.

Regional government is a rock that many have foundered upon, but functional consolidation as opposed to political merger has proved a practical alternative in providing some measure of co-operation. The Foundation and a number of local officials and citizens it consulted believed that environmental issues presented an opportunity to encourage such regional cooperation through a new kind of management system. For one thing, the environment has developed a strong, if somewhat disorganized, constituency that transcends political preferences and geographic boundaries.

Among the criteria the Foundation used in surveying areas that might be favorable to experimental regional projects, the following were central:

—A metropolitan area with a population range from 150,000 to 1.5 million—large enough to include a representative array of problems and administrative complexities, but small enough to allow effective, innovative personal leadership to make an impact.

—Environmental problems sufficiently well defined that cooperative planning and administrative energies could be immediately applied with reasonable expectations of controlling them.

—An existing government structure with potential to handle re-

gional problems beyond its own immediate political boundaries. This was found most often in counties with one predominant urban center.

—The absence of major political or economic complications that philanthropic aid cannot address.

—Not the least important, at least one administrator in a key position with the demonstrated ability to get things done.

The Foundation invited various public officials to develop proposals addressed to issues perceived to be timely and important in their communities.

Grants totaling \$2.9 million in six geographical areas were made. The experiments are being conducted in San Diego County (Calif.); Erie County (Pa.); Nashville-Davidson (Tenn.); Seattle (Wash.); Vancouver (through a grant to the University of British Columbia), and the island of Oahu (through a grant to the University of Hawaii).

The underlying purpose of the Regional Environmental Management (REM) experiments is to bring together public administrators, academic experts, and citizen groups to work out rational methods whereby each community can guide its own development with forewarning of the consequences of any given decision for environmental quality, economic health, and social equity. The overall aim is not only to solve particular environmental problems but also to develop new institutional arrangements to improve environmental management.

The Foundation's grants are essentially designed to provide a frame in which interdisciplinary and interagency staff can work to resolve common problems.

Following are descriptions of the six REM experiments.

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Erie County, Pennsylvania

STATES ARE RESPONSIBLE for setting and enforcing environmental standards, but few have the personnel or organizational machinery to monitor enforcement effectively. Being “on the scene” is indispensable for quick response to citizens’ complaints or immediate action against flagrant abuses. State officials, whether in the capital or regional offices, are usually too far away, or insufficiently familiar with local conditions to do more than buck the problems through bureaucratic channels. But even where the states are willing to delegate the necessary authority most local governments are not equipped to take on enforcement duties.

In Pennsylvania, however, an arrangement has been worked out with the Erie County Department of Health to enforce environmental laws throughout the county, which includes some 267,000 people. The state agreed to delegate its authority to the county provided the Health Department could assemble the necessary resources and trained personnel. It was at this point, in 1971, that the Ford Foundation granted funds to enable the department to establish a bureau of environmental health, separate from personal health services, and to create and staff three new divisions: engineering (responsible for water quality), occupational health and safety, and legal action. These were added to two older divisions—rodent control, which runs neighborhood cleanups including the regular placement of rodent bait, and an educational program in the schools, and sanitation, which monitors the cleanliness of public eating places and recreational sites, institutions such as schools and nursing homes, and outdoor areas such as migrant labor camps, and mobile home parks.

Gathering all environmental control efforts into one coordinated program was an important step forward for Erie County, but the new environmental team did not have to start from scratch. They had nearly ten years of citizen concern, agitation, and petition to build on.

Beginning in the early 1960s word began to spread that Lake Erie was being choked to death by a combination of industrial waste and municipal sewage discharges. Smaller lakes and streams were also being polluted, and fish deprived of oxygen were found dead or dying, floating in the waters or strewn on the shores. Vacationers began to pass the news—the fish are dying, the water is unfit to drink, or even to swim in; don’t go to Lake Erie. In five

years the tourist industry, which represents the largest single segment of Erie County's economy, declined by 30 per cent.

Fishermen and other Erie County members of the Pennsylvania Federation of Sportsmen were the first to sound the alarm, petitioning the state capital and congress to take some action. The sportsmen were soon joined by conservation organizations, the League of Women Voters, American Association of University Women, and others. In 1965 some of these groups participated with the Erie County Department of Health and representatives of local government in an environmental health survey. Called *Erie-land*—2,000, the survey was one of the first organized efforts in Erie County to involve citizens in environmental planning. Numerous recommendations were made in such areas as water pollution, disposal of liquid and solid wastes, and air pollution.

Impatient to get started on some of the recommendations, particularly for cleaning up the Lake, the County Health Department, with the support of the County Commissioners, created a water pollution section even though the county still lacked state authority for environmental control activities. The person hired was called a sanitarian, but he spent most of his time investigating pollution of lakes and streams and reporting the problems he uncovered to the state. Sportsmen in the area acted as scouts for the section. Gradually, the state began asking the section for help in tracking down violations. This informal, unauthorized pilot project became the cornerstone of future county and state cooperation in environmental control.

In the meantime, Health Department personnel launched a citizen outreach program. They spoke at hundreds of meetings—of garden clubs, sportsmen and conservationists, business, labor, and university organizations—explaining the need for improved local environmental control programs and increased citizen involvement in environmental protection. The combination of initiative in investigating immediate problems and arousing citizen concern culminated in the new environmental program vested in the County Department of Health.

Accomplishments. Generally the program's results have been good. Fishing and swimming in the Lake, especially around Presque Isle, the prime recreation area, are the best in ten years, and the tourist

trade is flourishing once again. Plans are proceeding to build regional water supply and sewage systems to accommodate expanding residential areas outside the city, and to replace inadequate septic tank systems. Some of the storm and sanitary sewers in Erie City have been separated, thus cutting down the danger of pollution of lakes and streams through overloading in bad weather. Various smaller municipalities have been assisted in obtaining state and federal funding to upgrade or build new sewage treatment facilities. The department's engineering division has been encouraging the formation of regional sewer authorities to begin handling sewerage on a broader basis.

Industrial pollution has been cut, due partly to stiffer federal and state environmental laws, but also to strict enforcement by the health department. In addition, according to a spokesman for a manufacturers' association, businessmen like the direct, person-to-person approach possible in a local program.

Unlike some of the other REM projects, the Erie group has not attempted any mathematical modeling on which to base long-range environmental plans. Nor has it established direct relations with a university. But considerable research data have been accumulated, including an inventory of industrial solid wastes and provisions for disposal and a comprehensive Lake Erie sampling program in the Pennsylvania waters. The study, now entering its third year, is developing the data necessary to implement a water management program. Most of this research has been conducted by arrangement with the Great Lakes Research Institute, funded by local government and industry, and subcontracted to colleges and industrial research laboratories in the area. Working through the institute the department has been able to tap the county's scientific and technical expertise without being tied to one academic or industrial group.

Another source of the project's effectiveness has been the presence on its staff of a full-time attorney, hired and paid by the county but also appointed as an assistant State Attorney General. He is therefore qualified to represent the state as well as the county in local courts trying violations of environmental laws. This extra leverage has resulted in a stronger water pollution program and also strengthened the sanitation division's enforcement of health regulations in public places.

The program's establishment has also made possible a new level of county-federal cooperation. In 1972 the county entered into an agreement with the federal Department of Labor to enforce the Occupational Safety and Health Act. Staff inspectors thereby have the force of federal law in monitoring work places in the county.

Finally, Erie's health department has demonstrated that environmental control powers can be delegated to a local government agency and that with the authority to assume the enforcement roles of state and federal agencies a county's environmental health can be significantly upgraded.

Overall the success of the county program is due mainly to trained personnel and their familiarity with the region. As one staff member remarked, "We don't have to travel 100 or 200 miles to check a violation. At most it takes us an hour to get to the problem site. And we know what to look for."

Problems. Despite the department's achievements, there have been disappointments and frustrations.

Under the Ford Foundation grant the county had planned to assume partial responsibility for air pollution control. So far, however, the necessary county-state cooperative arrangements have not been worked out.

Although a long-range program to deal with the county's solid waste problem is crucial, no solutions are yet in sight. In 1971 the county designed a model for recycling waste. Local government and industry asked for federal funding to build a pilot plant, but with cutbacks in federal solid waste funds the project did not materialize. Similarly, in 1972 a proposal was made to construct an energy recovery system using solid waste as a fuel to produce steam for local industry, as in Nashville and other cities. Again federal funds were unavailable, so the plan was shelved. The Erie Solid Waste Management Authority therefore concentrated on an interim plan—establishing at least two sanitary landfills. There has been serious public opposition in every area considered for a landfill, however. The Department of Health has spent considerable effort to present information on this method of handling garbage and refuse, but people apparently still equate a landfill with an old-fashioned, unsightly, and unsanitary open dump—and they don't want one near them.

There is also a need to codify the research gathered in the past few years and to computerize it for easy retrieval. In addition, a more comprehensive information program is required to acquaint the public with the programs under way and to provide the factual basis for decisions on what remains to be done.

In the summer of 1973 the department faced its severest test. The problem centered around the State Sewage Facilities Act, administered by the county since 1967. Among other things, the act requires the issuance of a permit for each on-lot sewage system, which means for most homes a septic tank. But Erie County's soils, of glacial origin, are predominantly clay, and 80 per cent of the land in the county does not meet state standards. When the county began to enforce these standards in 1967, numerous building lot applications for septic tanks were rejected. Two alternate systems were proposed by the state, but neither proved workable in Erie. In 1970, therefore, the county designed its own system—a septic tank with two to three feet of filter sand. Permits were granted for such tanks and forwarded to the state. The county, hearing no objections, thought the system was approved. Then in July 1973 the state ordered the county to stop issuing permits and to revoke existing permits because they had never been officially approved by the state.

The order came as a shock to the Department of Health. Years of effort had gone into developing the alternate system and gaining the cooperation of builders, developers, realtors, septic-tank installers, and the public. Several meetings were held with state officials and it was finally agreed that no permit would be revoked until some alternatives were available. Finally the state agreed to allow the use of the Erie County system, with an increase in the depth of the sand filter to three and one-half feet, to modify permits already issued, but not for new construction. New permits cannot be issued until state laws and regulations are changed, a process that is not expected to be completed until early 1975.

Beyond highlighting the difficulties of maintaining cooperation between levels of government, this issue could have far-reaching ramifications. "Most citizens in Pennsylvania," one staff member remarks, "have supported strong environmental control programs in the past, but usually industry, business, or municipalities have borne the brunt of them. It will be interesting to see the reaction

when people discover that strict sewage controls can drastically restrict home building.

"This particular problem will be eased as sewage lines are extended from Erie City to outlying areas, but it will be a few years before that operation is completed. In the meantime, unless technology improves to the point where the state regulations can be enforced without undue hardship to property-owners, the county and the state will have to continue with the current compromise. It's been a hard time for us, but things would have been a lot worse for the people of Erie County if our department hadn't been on hand to help work things out."

Kaneohe Bay, Hawaii

A BOOM IN TOURISM and real estate investment has brought to Hawaii, America's "Paradise of the Pacific," all the land-use problems plaguing mainland states such as California, Washington, and Pennsylvania. The double boom fostered tremendous population growth on the island of Oahu during the 1960s and early 1970s and led to a proliferation of speculative, second-home and condominium developments.

The result has been severe stress on the ability of Hawaiian institutions to deal with growth-related problems. Housing prices are soaring, cutting off the vast majority of families from homeownership. Living costs in Honolulu are rated nationally as second only to those in Anchorage, Alaska. Pressures for urban expansion are often in open conflict with community interests in preserving valuable agricultural lands and minimizing environmental degradation.

The Hawaii Environmental Simulation Laboratory (HESL) at the University of Hawaii was organized early in 1971, with Ford Foundation funding, to help government agencies, community groups, and politicians cope with the problems associated with rapid urbanization. In 1972 the Foundation's grant was renewed, and the project also received major funding from the National Science Foundation.

HESL deals primarily in the transfer of research findings to those who can use them in managing the environment. The project is an experiment to see whether state and local governments can increase the rate at which they incorporate new methods of dealing with new social concerns.

HESL's main emphasis has been on investigating the short-run impacts of changes in watersheds undergoing transition from rural to urban land use. Its working philosophy has been that increasing the information available to citizens, planners, and decision-makers will help them make "better" decisions.

To help focus its activities, HESL decided to concentrate on the Kaneohe Bay watershed on the Windward side of Oahu. The region was chosen because it is a microcosm of what is happening in Hawaii. The population is representative of the broad cross section of Hawaii's people, from native Hawaiians to Filipinos. The region is undergoing rapid urbanization, with consequent loss of open space, encroachment on flood-plain areas, and rapid decline of the coral-based ecological systems in the Bay itself.

Several major projects affecting the future of the area are pending: construction of a major freeway from the Kaneohe region across the Koolau Range to the Honolulu side of the island; diversion of sewage away from Kaneohe Bay through an offshore outfall in the open ocean; construction of two major flood-control projects, and zoning amendment to allow several large housing developments.

HESL's objective is not to advocate or oppose these projects or development in general but to provide citizens, planners, and decision-makers with information that will help them assess alternative courses of action. A recent HESL report prepared for the state's Office of Environmental Quality Control and entitled *Kaneohe Alternatives: An Application of Impact Methodology*, demonstrates how various planning tools can be used to assess alternative futures for the Kaneohe region. The report's analytical techniques include estimation of capacity and cost of overload for five types of public facilities, soil loss and runoff resulting from urbanization, and variation in housing cost due to site characteristics.

By working closely with its clients—both in determining what research projects should be undertaken and in determining the particular form for packaging information or making analytical tools available—HESL has tried to ensure that its information and analytical techniques will be used. Although every effort to achieve truly interactive relations has not been successful, those that have been highly interactive are the ones where HESL has had its greatest impact. HESL has been more successful in transferring new information and concepts but sees promise for transferring new methodologies as well now that they have been demonstrated in the *Kaneohe Alternatives* report. An upcoming report to the 1975 State Legislature, on approaches to defining potential threats to the environment and utilizing these approaches in environmental management programs, offers another excellent vehicle for presenting new methodologies.

HESL's organizational structure has evolved from staff specialization to a team approach. Initially, the staff was divided into two sections: Modeling and Data, responsible for adapting new methodologies to the Hawaiian situation, and Community Interaction, which aimed to convey community concerns to the modelers, to insure that cooperative relations were maintained with planners

and decision-makers, and to help “sell” the finished tools as they became available.

This division of effort proved artificial and a barrier to truly interactive relations. Gradually, therefore, the project has adopted a team approach by organizing a number of task groups whose sole purpose is to produce specific products.

Staff members working on the task groups are responsible both for developing analytical tools and for insuring that “community interaction” occurs. The current groups are Watershed and Flood-Plain Management, Carrying Capacity, Local Community Interaction, and Computer Services and Information Systems.

Work in the different areas is coordinated by a Management Group (composed of key staff members and the project’s principal investigator) and a Core Group (made up of university faculty members from such disciplines as engineering, urban planning, and ecology, plus State Senator Kenneth Brown, and the principal investigator). The Management Group deals with day-to-day problems of administration and coordination, and the Core Group copes with policy matters such as possible political ramifications of new research or other project activities.

Senator Brown is also Chairman of HESL’s Community Council, comprised of representatives of business, the media, public agencies, the military, and community groups. The council’s relation to the project is similar in many respects to an organizational advisory board.

In developing analytical techniques, HESL’s philosophy has been to shun the large-scale model approach and to emphasize activities that increase the likelihood that planners will adopt the techniques. The staff believes that large-scale models that purport to predict patterns of future urban growth are not only costly and difficult to understand, but are often misleading because they give the semblance of being more accurate than they are. Such models, the staff holds, have not generally demonstrated great usefulness as predictive devices, often make questionable theoretical assumptions, and are extremely difficult to validate.

As a consequence, HESL turned its attention to more modest models characterized by easily perceived logic, conditional predictiveness, and ease of use. Planners are more likely to adopt methods that are not “black boxes,” that can be easily adapted to

incorporate a variety of assumptions about important variables, and that are packaged so as to be relatively easy to apply.

HESL's research in sedimentation illustrates the value of the staff's modeling approach. At the request of a Kaneohe Bay community group, HESL, using University of Hawaii research findings, adapted the Universal Soil Loss Equation (USLE) to Hawaiian conditions in order to estimate erosion from construction sites. Subsequently, a consultant to the largest proposed residential development in Windward Oahu asked for an introduction to the USLE methodology, and the Army Corps of Engineers asked for estimates of erosion during construction of a Kaneohe flood-control project. The Soil Conservation Service (SCS) later requested copies of the erosion estimates HESL had made for the corps and used them in a technical note on the use of the USLE in Hawaii, particularly in construction activities.

The high rate of utilization of HESL's work in this case appears to be because the package met many of the criteria noted above—transparent logic, ease of incorporation of varied assumptions, low application cost, and lucid packaging.

Not only was the transfer of a new methodology to Hawaii facilitated by HESL research on sedimentation, but because of related research, HESL was also able to contribute to discussions of proposed county erosion standards and the overloading of streams in aggravating Hawaiian flooding.

One of HESL's primary objectives has been to increase the effectiveness of community groups in the environmental planning process. HESL's efforts here have been shaped to the needs of the various groups and therefore differ significantly from its work with agency planners. Community groups generally are more interested in information about the planning process or translations of technical reports than they are in the detailed workings and results of specific analytical techniques.

HESL has answered a wide range of requests for assistance from community groups, developed games to simulate experiences with planning problems, and, to help clarify discussion, provided planning and environmental education materials. It has also conducted oral history surveys, and maintained a field office in the study area.

Staff effort has focused on three major community groups concerned with planning and development in the Kaneohe region.

Members of the groups report that HESL has been very helpful on a number of occasions, particularly where it performed a "translator" service, as in the review of the work plan and draft environmental statement for a major flood-control project in Kahaluu. On another occasion HESL provided the technical analysis necessary to document environmental concerns not normally raised in the planning process, such as recent estimates of the effect of urbanization on flooding in Ahuimanu valley.

By trying to ensure that its research is relevant to current community issues, HESL occasionally finds itself caught in a political cross fire. The intrusion of HESL's resources into the current bitter controversy over land-use decisions is often regarded with animosity by those whose positions are undermined by HESL's analyses. Claimed "objectivity" does nothing to reduce such ill feelings. In such cases, HESL finds itself walking a tightrope between agencies and citizen groups or between competing citizen groups, which are extremely sensitive to even the slightest hint of advocacy.

There may be no completely satisfactory solution to the conflicting goals of speaking out on relevant issues and maintaining a wide range of close client relationships. A partial solution, which helps to mitigate ill feelings somewhat, is to insure that all sides of the controversy have equal access to any pertinent HESL-generated research. In that way HESL's information cannot be used by one side to "ambush" the other.

During the final year of Ford and federal funding, the HESL project will be attempting to demonstrate how information and methods it has developed and used in the Kaneohe Bay region can be applied to a range of issues in the whole State of Hawaii. They include the need to cope with threats to the environment in critical areas, the need to plan wisely for land uses in the coastal zone, and the need to comply with new federal legislation requiring enlightened flood-plain management. The success of HESL's demonstration will determine whether it can continue to contribute to Hawaiian planning.

Seattle, Washington

DURING THE ALASKA GOLD RUSH at the end of the nineteenth century Seattle, Washington, became a boom town, and it has been the principal city of the Pacific Northwest ever since. Seattle's metropolitan area contains some 1.5 million people, more than one-third of the state's population. The environmental costs of that concentration and the region's steady economic expansion since World War II first became apparent in the late 1950s with the increasing pollution of Lake Washington, which borders the city.

To start the clean-up process the voters in 1957 authorized the creation of a metropolitan corporation, called Metro, which formed the nucleus for subsequent efforts to deal with environmental problems on a regional basis. Phase I, a comprehensive sewerage system for the region, was completed in 1970, and the following year Metro's governing council was expanded to include all of the municipalities in surrounding King County. In 1972, following a state directive to develop water pollution control and abatement plans for the Cedar and Green River basins, an environmental planning group was formed—the River Basin Coordinating Committee (RIBCO). The committee is made up of representatives of counties, cities, utility districts, and state and federal agencies serving the two basins.

Charged with the task of giving government officials the information required to integrate the management of sewage and solid waste disposal, land-use practices, storm water drainage, water supply, and air pollution control, RIBCO began a two-year project to design a comprehensive environmental management plan for the river basins, which include the metropolitan Seattle area. To complement the planning group's technical studies, which are being supported by \$4.4 million in grants from federal, state, and local government sources, the governing council also established a separate Citizens Task Force, to promote public participation in the overall planning design and to advise Metro and RIBCO on citizen concerns.

The task force has twenty-four members, representing labor, business, and real estate, and environmental, conservation, and community organizations. Shortly after the task force was formed, Metro received a grant from the Ford Foundation to enlarge community involvement through regional meetings, workshops, and communications media.

Seven rounds of nine community meetings each have been held, with attendance ranging from a low of five to a high of 100, and totalling about 1400. Workshops also were held to familiarize task force members, policy makers, and community leaders with the kind of analytic planning being undertaken by RIBCO, to help them assess the work in progress, and to explore the underlying assumptions on which the plans are being developed.

One of the primary aims of the task force was to try to bridge the inevitable communications gap between experts and the publics they serve. Most environmental planners are technicians who deal in complicated interrelations among transportation, housing, public services, pollution control, water and waste management. They tend to express themselves in technical terms that are all but incomprehensible to the general public.

The task force quickly discovered that one of its main functions was to translate extremely technical information into laymen's language. Yet as they went from meeting to meeting they realized that while they were focusing on engineering and scientific aspects of the plans, the citizens were cutting past such details and raising broad questions of environmental policy—or land-use controls, for example, or population growth, or conservation. The interests expressed at the meetings tallied with responses to questionnaires the staff mailed to 15,000 people and with a random sample survey of King County.

The staff concluded that citizen participation should have been sought out and incorporated two years earlier when RIBCO was first established, before the technical studies had been decided upon, and before the broad scope of the committee's work had been determined. At that preliminary stage citizens would have been in a position to inform the planners of issues that most concerned them and in that way influence the premises on which subsequent planning was based.

That the public was not brought into the planning process until midway, so to speak, was a limiting factor in the task force's later efforts. Some of the major concerns articulated at the meetings—regional land-use controls and introducing conservation practices before tapping new sources of supplies of water or energy—had not been included in RIBCO's study designs. Citizens also questioned the population forecast on which all the RIBCO studies

were based—a projected increase of 32 per cent in the region's population by the year 2000. It was pointed out that if a limited growth policy were adopted the region's future needs—and the plans developed to meet them—would be quite different from those currently under consideration. But limited growth is a controversial issue and so far neither the regional council of governments nor any other local government agency has been willing to adopt it as a basis for planning. As a result the task force itself is preparing a study to explore alternate growth policies, including limited growth, and their possible effects on RIBCO plans. And, in the wake of the public discussion of RIBCO's planning studies, some local governments are becoming aware of the need to question the adequacy of traditional population forecasts for growth planning.

It would have been too expensive to overhaul the studies to include all the points raised at the community meetings but through the task force's intercession it proved possible to accommodate a few of them. Water conservation, for example, is now being given more consideration than previously. Also, citizens indicated a strong preference for solid waste systems that include recycling and measures to recover resources, although it was recognized that recycling alone could not solve the problems of solid waste accumulation. This concern, reflecting a general preference for multipurpose solutions, will be incorporated into RIBCO's final plans.

The task force also made some useful discoveries about the use of communications in their work. Although they originally had high hopes for the use of videotapes as a means of keeping both the public and RIBCO members abreast of each other's activities, they soon concluded that it had severe limitations as a citizen participation tool. They learned that videotaping is most effective when there is a conflict that is at least in part a result of a gap in communication. In such instances videotapes can be used as communication tools. Since there were no such conflicts in the RIBCO program, citizens generally found tapes of the RIBCO committee sessions boring. And RIBCO members, in viewing tapes of community meetings, had difficulty sorting out the citizens' particular concerns. Consequently, task force staff often found themselves interpreting the citizens' discussions, with the risk of slant-

ing or prejudicing community opinions in trying to translate them. The videotape program was therefore discontinued.

The staff also found traditional television public affairs programs an unsatisfactory way to involve citizens in the planning process. They are time-consuming to prepare, they reach few new people, and it is difficult to determine viewers' reactions to them. Nevertheless, they can be useful in providing information, and the staff plans to sponsor three short documentaries on RIBCO's final proposals.

Furthermore, the task force learned the danger of becoming so absorbed in the planning process that the broad issues that most concern the citizenry get lost. Finally, the task force's experience suggests that any effort to involve citizens in complex environmental planning should be thoroughly researched before committees are formed and programs organized. It should be determined at the outset whether citizens want to participate—at every stage, only at the beginning, at the end, or not at all. If they don't want to take part, it is probably futile to try to entice them to do so. In the Seattle case there has proved to be a solid core of citizen interest, and although the program started later than it should have, it has given the public a means of expressing that interest and thereby influencing the region's environmental future.

Nashville-Davidson County, Tennessee

NASHVILLE-DAVIDSON COUNTY, one of Tennessee's major industrial, business, and population centers, is perhaps better able to cope with growth and development than other areas its size (533 square miles and 470,000 people) because it has a metropolitan, countywide government. Called "Metro," and formed in 1963 out of the consolidation of the city of Nashville and the surrounding county, it replaced a multiplicity of overlapping, often conflicting governmental councils, districts, administrative boards, and agencies.

But even with its centralized structure there was little coordination among the departments responsible for various facets of the environment—transportation and land-use planning, sewage and surface water supply, solid waste disposal, and public health, for example. As the county grew, environmental threats turned to hazards, particularly in garbage accumulation and water and air pollution. Representatives of government and industry concluded that a greater degree of management sophistication and integration of environmental programs had become essential. In 1972, therefore, Metro created an Environmental Planning and Management Project (EPMP) within the county government. A grant from the Ford Foundation provided staff to coordinate its activities.

Designed to involve a broad range of community interests, the project is directed by three co-managers, one each representing local government, the academic community, and industry, business, and citizen groups. The temptation of creating a new super-bureaucracy to manage the environment was avoided by working through existing Metro agencies and departments.*

Rather than draw up a detailed blueprint for long-range action, EPMP decided to respond to immediate problems, do something useful about them, and then, having established a measure of

*A core management team was organized consisting of the heads of the Metropolitan Planning Commission, and the departments of Health, Public Works, Law, and Water and Sewerage Services. Grant funds made possible the hiring of a project coordinator (a graduate of the Vanderbilt Graduate School of Management), and special staff assistants to assist the department heads with planning.

The project also established links with the forty-one member Metropolitan Council, a special environmental committee of the Chamber of Commerce, and the Nashville Urban Observatory, a research and training institute created by six local colleges and universities and the Metropolitan Government; it is part of a national network of urban observatories sponsored by the National League of Cities.

credibility, proceed to address wider policy issues related to future growth.

The first problem tackled was the meatpacking industry's discharge of effluents into the Cumberland River, which snakes through the county and is one of the state's major natural resources. Waste water the plants dumped into a sewer contained suspended solids, grease, and other matter in excess of limits permitted by the metropolitan waste water ordinance.

Metro's long-term solution for the slaughterhouses is an industrial park of several hundred acres downriver from the city with special provisions for industries that need large amounts of water and efficient means to dispose of or recycle it. Until it becomes a reality—possibly five to ten years hence—EPMP settled on a practical and workable compromise.

A task force consisting of the project coordinator and two scientific consultants surveyed and analyzed the industry's waste water problems and made several recommendations that the industry adopted. Thereby the plants reduced their water usage and in some instances the net load of pollutants. At the same time the law department began work on a new ordinance that would comply with the 1972 Water Pollution Control Act but would not drive the meatpackers out of business. They provide employment to about 1,500 people locally and have a combined annual payroll of over \$14 million.

The meatpackers themselves were cooperative. Many had been in Nashville for years, had a competent work force, and had no wish to leave. Besides, no matter where they went they would be confronted with federal clean water requirements, and state water pollution laws as stringent as Tennessee's.

Later, project staff served as liaison between Metro and a new industry that will further ease the waste problems not only of the meatpackers but also of institutions that generate large amounts of food scraps—such as university, school, and hospital kitchens—by converting the scraps into food pellets for hogs. The staff advised industry representatives on such matters as Nashville's air pollution standards, plant site selection, trucking routes to and from the plant area, and proper containers for the waste. The land for the new factory has been purchased and plans drawn up; private funding for construction costs is being negotiated.

Solid Waste. Nashville-Davidson resembles nearly every other community in the United States in that it has an enormous garbage problem that is fast becoming a crisis. Every day some 1,400 tons of refuse are collected. The county has several landfills, but until recently none met the state's standards to qualify for state aid in operating them. In 1973 the project provided funds to the Public Works Department for consultant assistance in preparing a new landfill application. Specifications for the application were based on the consultants' hydrogeology and water analysis of an existing, nonpolluting landfill. A site was found matching the specifications, the new landfill opened in September 1973, and Metro received a state grant of \$400,000 for the first year's operation.

Although the need for landfills is generally acknowledged, nobody wants one in his neighborhood. One of the project staff is photographing the operation of the new fill over a period of months. A narrative and slide show of the results will be made available to citizen and environmental groups to illustrate that sanitary landfills are radically different from open dumps—neither an eyesore nor a health menace.

A longer term solution to Nashville's solid waste disposal crisis consists of the new and much publicized Thermal Transfer Plant, which converts refuse to 300-degree steam for heat in winter and 40-degree chilled water for airconditioning in summer. The steam and cold water are piped underground through 15,000 feet of trenching to serve some thirty government and private buildings in downtown Nashville. After use the condensed steam and warmed water are returned to the plant in a constant cycle.

The plant is expected to operate at about 30 per cent of the cost of using conventional fuel. It will also reduce pollution and save energy by replacing small heating plants throughout the city, which now generate excessive particulate matter and sulfur oxides. In its initial phase, the plant will save some 20 million kilowatt-hours in electrical usage, and, when completed, more than 71 million kilowatt-hours per year.

The community has high hopes for the thermal plant, which began operations in May 1974, but for the first year or two it will only handle approximately 50 per cent of the garbage generated in the county, about 720 tons of refuse a day. Eventually the plant will be expanded to twice its capacity and consume nearly all the

county's domestic, and some of its industrial solid waste. In the meantime, the county still needs landfills as a disposal method—a minimum of 100 acres, on two sites.

Team Building. One of the distinguishing characteristics of the Nashville experiment is the diversity of persons involved. There are government and business professionals long familiar with the byways of the county's bureaucracy and economic power centers, community representatives of diverse economic and social backgrounds, and youthful staff assistants quick to lend a hand on a variety of tasks. For example, in mid-1973 the Planning Commission and Departments of Public Works and Traffic needed an aerial photographic survey to plan traffic routes for municipal and private haulers bringing solid waste to transfer sections for compacting and then removing it either to the thermal plant or landfills. A young man on the project staff hired a small airplane and pilot and did the survey singlehandedly. He leaned out the plane door, hung on with one hand and handled the camera with the other. The survey was completed quickly, at far less cost than if an outside team had been hired, and was a highly professional job. And, while pipes were being laid to connect the thermal plant with the buildings it would service, two other project staff members helped plan new traffic routes each week or ten days as the digging proceeded through the downtown area.

To help strengthen the Metropolitan Council, whose forty-one elected members serve part-time and have never had permanent staff assistance, the project has provided an environmental legislative aide to work full time for the council's environmental committee. He provides background information and analyses of proposed environmental legislation and other proposals so that members can more accurately judge whether they serve their constituents' needs and interests.

Getting the department heads to work together as a team, one of the primary goals of the project, was easier to proclaim than to achieve, however. Each of Metro's departments is fairly autonomous. The first five or six meetings of the new team members were affable but unproductive. There was a palpable reserve about the participants' discussions, reflecting perhaps a resistance to having their turf encroached upon and their independence diminished.

The problem was tackled unofficially by the project's historian and public information officer. Sensing that the department heads might be feeling a bit threatened by the new cooperative scheme, he took a tape recorder and engaged each one in a long conversation on the project's goals and how to achieve them. With the participants' permission the transcripts of all the conversations were distributed to those interviewed. Having talked freely in private and then finding that others shared their hesitations, doubts, and fears, the department heads were notably more relaxed at subsequent meetings and more willing to speak their minds.

Gradually interdepartmental task forces were established to deal with specific problems, such as locating suitable sites to which construction and demolition companies can deliver large-scale waste products. Five privately operated sites have been opened. The directors have also begun to collaborate on drawing up new ordinances—on noise control, for example, and on the mandatory collection of waste oil from industries and filling stations. The latter requires all waste oil to be delivered to the new thermal plant where it is stored for emergency use should the refuse incinerators break down. Previously the oil was dumped into sanitary sewers, putting excessive burden on treatment facilities, or into the river, causing pollution.

The management team is trying to keep a balance between planning ahead and responding to immediate problems. The tentative schedule is to deal successively with solid waste, water supply, sewer and storm water, air quality, energy, and transportation, and ultimately tie all these elements into a comprehensive land-use plan. At some stage, the managers and team realize, the project will probably require simulation modeling machinery and personnel.

Small-scale modeling will be part of a study recently launched by the Planning Commission and U.S. Geological Survey, with project staff assistance. The effects of urban development alternatives will be assessed by simulating rainfall runoff and other flooding characteristics of four drainage basins in the county.

This study reflects a rising concern in Nashville with the consequences of increased pressures for growth and development in the county. The project has further responded to this concern with a short-range investigation of growth-related issues and possible policies for managing them in one section of the county. The staff

is also providing research and technical assistance to the wide-ranging Nashville Goals Development Program, recently established by the mayor. It aims to formulate long-term policies to regulate growth throughout the county over the next ten years.

As the project activities and experience have widened, its managers and staff have been called upon to contribute to national forums and task forces on a variety of environmental questions. Topics have included environmental management in general and solid waste and water management in particular, growth policies, and the energy crisis. The project has also been asked by the United States Information Agency to help film the story of Nashville's approach to energy recovery and conversion in the Thermal Transfer plant.

Public Participation. From the beginning strong emphasis has been put on keeping the public informed of the project's activities and involving citizens in its planning and decision-making. But in Nashville, as elsewhere, citizen participation remains an ideal many bow to and most trip over. The staff has been more successful at getting information out than at drawing citizens in. Although local government representatives are committed to citizen participation in decisions affecting the environment, some of the leaders of the private sector are less sanguine about involving citizens in complex issues. Accustomed to handling such matters in small groups ("All it takes is an hour over lunch and a few of us can settle most any problem quickly and efficiently"), they are uncomfortable with time-consuming public meetings and the rambling, often ill informed or confused remarks of citizens attending them. In any case, public hearings on such matters as extending sewage services to outlying suburbs are poorly attended, and even the citizens who do turn up often seem hesitant to speak out.

Nevertheless the environmental management team believes that new ways can be found to discover citizens' views on the environment generally and on particular projects. It was found, for example, in an experiment conducted by a graduate student engaged by the staff, that contacting individuals block by block and asking their views on particular subjects elicits a livelier citizen response than large hearings. This method will be repeated in several council districts.

And starting in 1974 project staff inaugurated a series of informal community forums in various parts of the county to explore a broad range of environmental issues. They are attended by civic leaders, academics, and government policy-makers who are there to take part in the discussions, not make speeches. To get the informal dialogues going the staff opens with a film, "Environmental FILMSPEAK," produced by the project with a grant from the Tennessee Committee for the Humanities. The aim is to elicit citizen opinion on their priorities so that they can help set the county's environmental agenda instead of simply reacting to fixed government plans or ongoing projects. The forums have been well attended and the discussions lively.

In the meantime the staff is reaching out to the public through various media. A newsletter provides a forum for environmental groups, by focusing on a broad range of policies and problems, not on the project itself. The staff is also developing increasing sophistication in the use of slides, photographs, and videotapes to help bring alive environmental issues. In 1974 the project won a National Association of Counties achievement award for presenting technical information in dramatic, easily understandable form in its narrated slide show, "Why Live in Nashville?"

Vancouver, British Columbia

THE CANADIAN WEST'S largest urban area is Vancouver, British Columbia. Population grew during the 1960s at a rate of 3.5 per cent a year, and is now about 450,000 in the city of Vancouver and some 1.1 million in the surrounding metropolitan region. In 1968, the first sign of trouble from the rapid growth occurred on the city's beaches in the Strait of Georgia. Sewage was traditionally dumped into the strait but only a small amount received even primary treatment, eventually causing a health hazard for swimmers. Around the same time the University of British Columbia had established a resource science workshop for faculty and students from various departments. The workshop was an outgrowth of a Foundation-supported environmental training grant at the university (one of a series made in the late 1960s) aimed at applying the specialized knowledge of ecological sciences to environmental management. Its first project was to create a recreational land-use model of one of the Gulf Islands in the strait. When the model was operational the university invited public officials responsible for land development on the islands to use the simulation model to explore the consequences of development plans then under consideration. Many accepted the invitation, and the effect was to freeze all development of the Gulf Islands until land-use plans were prepared and commented upon by the islands' permanent and summer residents. Subsequently local government officials offered to provide the university scientists with data and manpower to develop a regional simulation model that would incorporate economic, physical, ecological, social, and political dimensions. Negotiations that followed resulted in the Inter-Institutional Policy Simulator (IIPS), a REM experiment established at the university in 1970 and partially funded by the Ford Foundation. It is run by a core group consisting of university faculty, the heads of four departments of the city of Vancouver, and the planning director of the Greater Vancouver Regional District. Later the project was joined by representatives of the Department of Municipal Affairs of the province of British Columbia, and the federal government's Ministry of State for Urban Affairs.

The feeling at the time was that Vancouver was at an environmental and developmental crossroads. It resembled Los Angeles in the mid-1940s, in that despite the pressures of growth, there was still time to control urban sprawl and to guide development.

At the outset the various partners joined together on the general principle that they could develop better planning tools to help them decide what courses of action would make the region more livable. The development of these tools, in the form of computer simulation models, was envisioned as a five-year process at least, with perhaps another few years to test them adequately. Specific models were planned for pollution, waste disposal, transportation, land use, economics, and population growth. The models were to be used to simulate the effects of alternate environmental policies and management strategies. They were intended to give decision makers the means of estimating the long-range consequences of one or another policy decision. If for example, they chose a policy of no-growth, or limited growth, they would use a computer model to test various means of achieving it. Such means might be raising taxes, zoning the land to limit housing density, moving people out of the region, cutting water supplies or transportation facilities, declaring a moratorium on road building and new housing starts, or combining these and other options. The point of the models was to test whether various means of accomplishing a policy objective might produce the kind of region the people of Vancouver say they want now, or as one project member remarked "to let us make our mistakes in the machine rather than in reality."

No sooner had the project begun, however, than cracks in the partnership emerged. For one thing the broad general agreement on which they had come together proved to be too fragile to support the competing interinstitutional and jurisdictional interests and goals. Because they had not clearly formulated and stated specific objectives there were constant disagreements, misunderstandings, and a general hesitancy to put their cards on the table.

The government representatives apparently thought fairly simple tools could be devised to help them in their day-to-day work. But the process proved to be much more complicated than that. Further, for a variety of personal, professional, and political reasons they were reluctant to bring to the project a list of questions they would have liked to see tested. Some, for instance, did not want to show their ignorance in a public forum or expose themselves to possible criticism in front of their colleagues. And even those from the same discipline, but representing different jurisdictions, approached the same problem from dramatically different

points of view. A local government engineer, for example, will look at a transportation system in light of its service to the city. His counterpart in provincial government would be concerned with its utility to all fourteen municipal areas. It could be that a favored local policy would conflict with the regional and vice versa, causing long- or short-term transportation benefits to one and difficulties to the other.

The university people, for their part, were primarily interested in the modeling systems themselves. They wanted to construct models focusing on long-term phenomena such as population size, transportation and housing needs, and an exponential growth in solid waste by the year 2000. Officials on the other hand are under constant pressure to serve present citizen needs in health, education, and welfare, and to decide what to do about today's traffic jams, housing shortage, and accumulated garbage. Whenever they, in turn, tried to communicate some of that urgency to the academics they were quickly reminded that the project was designed for five years or longer. In that tug between a long-term project and short-term needs conflict was inevitable. Indeed conflict was built into the nature of the experiment at Vancouver.

By the end of 1972 these tensions within the IIPS project had slowed activities nearly to a standstill. Basically there were four problems: 1) an inability to determine which was more important, the process of getting institutions to work together, or the products—the models and their results; 2) a communications chasm among all the partners caused by their different experiences, disciplines, and institutional representation; 3) the early failure of the partners to specify the objectives each institution wished to achieve in the experiment, and 4) serious personal differences resulting in a withdrawal of participation by university personnel.

Mounting frustration, heightened by personality conflicts, led to the resignation of the two project co-directors, both university faculty members. Their departure increased the disillusion of the graduate students who were doing most of the day-by-day work on the models but who relied upon faculty inspiration and direction to coordinate their efforts. Governance of IIPS therefore shifted from the project directors to the core group made up largely of government representatives and a few university faculty members. Although governance by such a group was somewhat unwieldy,

the core group members managed to pull the pieces of the project together by concentrating on improving the process of interinstitutional cooperation, bridging the communications gap, and reducing the amount of modeling that would be produced. Perhaps most importantly the members hammered out two sets of objectives: those that were common to all the participating institutions—the university and four levels of government (city, regional, provincial, and federal)—and those that were specific to each.

At present, although there continues to be emphasis in the Vancouver experiment on complex, long-range models, there is also substantially more interest in providing immediate technical information to political and citizen groups as requested and required.

The difficulties have not disappeared altogether, however. Government representatives in the core group still must contend with the skeptical members of their own governing bodies, on the city, regional, provincial, and federal levels. And although realizing the necessity of reaching out to the wider citizen public through increased information services, project members recognize that they must be careful to keep the governing groups completely and fully informed lest they be accused of leaping over the heads of elected officials to woo the citizenry for their own purposes. Environmental interest among the citizens of Vancouver is high (there are more than 4,000 special interest groups in the region, a substantial number focusing on the environment), and their pressures on various governing bodies to clean up pollution, avoid excessive development, and protect the area's remarkable natural beauty, is insistent. They are more than willing to make use of any data or planning tools that will further their desire to "save Vancouver." Nevertheless the state of the art of modeling is less than mature, and project members are loath to release the only models currently available. The members believe that because these models are still rough and untested, they could create a great deal of misinformation if used indiscriminately by people with no technical background. For the present the project is making available whatever data and research results it can reasonably verify. When the models are fully tested the core group representatives of the university and all levels of government are committed to providing easy access to and use of the models by public and private interests.

San Diego, California

SAN DIEGO COUNTY'S BEAUTY was nearly its undoing. Its sunny climate, proximity to mountains and sea (its coastline on the Pacific extends for seventy miles, from San Clemente to the Mexican border), and large tracts of undeveloped land attracted waves of settlers, manufacturing and business interests, tourists, and real estate developers. The buildup began after World War II, and by the 1960s 20 per cent of California's growth was in San Diego. The county's population is now 1.5 million, more than half of which is in the city of San Diego, making it one of the state's largest urban centers. In the wake of this population growth, environmental problems began to surface—mounting solid waste, air and water pollution, inadequate sewerage.

Ad hoc groups of citizens, in one neighborhood or community after another, were the first to challenge the creeping sprawl that threatened to smother San Diego in housing projects and traffic jams. This citizen power successfully blocked several proposed housing subdivisions and high-rise apartments and also halted an Army Corps of Engineers project that threatened an ocean-front community with erosion and future flooding.

But these were relatively minor skirmishes in what many saw as a larger danger—massive developments by corporate real estate groups on thousands of acres near the coast. One proposal, for example, covered development of 36,000 acres and a new population of 350,000 in an area called North City, adjacent to the city of San Diego. The fear was that enormous chunks of land would be irreversibly committed to development with no comprehensive picture of how they would be related to each other or to the county as a whole, or of their cumulative impact on the quality of life in the area. Yet small, underfinanced, fragmented groups had little power before the corporate developers. They needed some established ally in local government that would consider environmental factors in all land-use proposals and weigh the costs and benefits of development to the public at large.

These conditions formed the background to the creation of an Integrated Regional Environmental Management (IREM) experiment within the San Diego County government, inaugurated with a Foundation grant in the spring of 1971.

Located within the newly formed Environmental Development Agency, the purpose of IREM was to coordinate the regulatory,

pollution-control functions of traditional environmental agencies with city and county land-use planning so that development could be put in a regional perspective.

IREM'S first year was unpromising. The project was beset with problems of organization, staffing, personnel changes, and difficulties in establishing strong links with city and county environmental agencies and gaining the confidence of the five-member Board of Supervisors. One of the chief stumbling blocks to cooperation was the traditional distrust between cities and the county, a phenomenon by no means peculiar to San Diego. Another was the negative attitude of some local officials toward planning (one remarked that it was contrary to the free enterprise system).

One of the early results of these difficulties was that instead of acting as a catalyst, organizing projects and helping line agencies carry them out, providing supplementary staff and funds when necessary to get them started, IREM became a research arm for the county planning organization. It was in this area—the gathering, organization and dissemination of information useful to local decision makers—that the IREM staff began to gain credibility. With patience, persistence, and increasing knowledge, they demonstrated the utility of sophisticated analytical techniques for defining environmental problems and proposing alternative solutions. In the process they developed agility in finding their way through the government maze, and gradually built working relations with line agencies and city and county officials.

Staff research concentrated on data useful for short-term decision making, to hold off developments that raised serious environmental questions. For example, an estuary study resulted in a moratorium on development in the threatened San Elijo and Baquitos lagoons. And a plan to develop a 6,000-acre tract known as Rancho San Diego was evaluated by a computer graphics firm engaged by the staff. As a result, the developer voluntarily rejected his own plan and redesigned the project in collaboration with county planners and engineers. The long-term aim was to help the county discourage proposals obviously not in the best interests of the region by providing technical evaluations and advice to land developers, and to develop broad public understanding and participation in planning so that pressure could be brought on developers when the occasion warranted.

IREM's most notable success with respect to development was in winning a two-year campaign to require that private developers prepare environmental impact statements similar to those required for developments using federal funds. The statements must be accepted by the Board of Supervisors before development can begin. IREM is responsible for reviewing and passing on the statements for all of the unincorporated areas of the county. Besides slowing and controlling the pace of urban growth in San Diego, this breakthrough paved the way for a new California law requiring such impact statements for private developments throughout the state.

The success and utility of the environmental impact review prompted the city and county to go a step farther and set up a joint task force to weigh the economic effects of any proposed development. Analysis includes not only the economic impact in the development's actual location but the spill-over effects in other parts of the county. For example, a 5,000-acre development in a particular jurisdiction will have dramatic implications for surrounding areas obliged to provide municipal services, employment, roads and schools. The task force reflects a growing recognition that new development often carries potential economic hardship as well as harmful environmental effects. The older assumption that new growth automatically brings more jobs and more tax income is being sharply questioned. Several recent studies in California (in San Francisco, Palo Alto, Half Moon Bay) indicate that the services required to accommodate the new growth—sewers, water, fire and police protection, roads—can be more costly than the tax benefits.

The task force is establishing policies requiring the kind of analysis that will enable local legislative bodies to establish growth priorities. The project began by analyzing five proposed developments in the county. Research focused on providing reliable cost and revenue information on each development proposal so that their impacts on neighboring jurisdictions' budgets could be determined beforehand. With such information, decision-makers can weigh the trade-offs between environmental impact and economic impact for all future land development in the region. It is possible that as the San Diego economic analysis model becomes more sophisticated it may stimulate a statewide move to require economic impact statements on all private land development just as

environmental reviews are now required. Eventually, the staff would like to fold into impact review procedures a means of determining other possible results of development, for example its seismic effects, contribution to noise pollution, or influence on conservation measures.

A further result of the IREM experiment is that San Diego now has one of the most detailed environmental data collections of any county in the United States. It has a computerized "early warning" system that allows a planner, private developer, or public agency to find out whether a piece of land proposed for development has any peculiar qualities that might make development unacceptable for any one of twenty-three reasons (for example, excessive sloping, load-bearing ability, existing population density, water supply and quality). IREM has also developed a set of indices for monitoring environmental changes in the area.

IREM has conducted a Natural Resource Inventory of San Diego, resulting in a nine-volume series of reports and 507 working maps of the resources of the region. The resource inventory will be expanded as new information is developed through the environmental impact statements. These data in turn will be used to increase the capacity of the early warning system.

Finally IREM has improved liaison with the public through an information program that includes a speakers' bureau, a list of regional recycling centers, and a bimonthly newspaper on county environmental concerns for schools, libraries, and citizen groups. It also sponsors open hearings where the public can comment on development proposals and other environmental issues.

In carrying out its work, IREM has established close relations with several groups in the region. Environmentalists have used the county's environmental impact reports and data process to monitor major land-use proposals, commenting on them in public, and trying to influence local decision makers for or against them. The academic community has used the data generated by the project as classroom instructional material and in support of individual scholars' research. IREM also received a \$130,000 National Science Foundation grant to coordinate and manage a series of environmental research projects at four local universities to test the hypothesis that the university community can assist local government in maintaining and enhancing environmental quality.

Moreover, the IREM staff has been in almost daily contact with the construction industry. On the whole the industry has proved cooperative, finding that working out problems before building begins is far less costly than dealing with citizen protests, long delays in court, and changes in specifications once construction starts. An industry representative is now playing a key role in the refinement of the economic analysis model. In dealing with the industry the IREM staff has stressed accurate information, relevant standards and criteria, and solid procedures. In that way they have created a climate of consistency and predictability, which has encouraged greater cooperation between builders and local government.

Finally, the staff now offers skilled professional assistance in environmental management to the thirteen smaller cities in the county that cannot afford their own staffs. As a result of a clean air research project conducted by IREM and funded by the Environmental Protection Agency (EPA), the staff has developed alternative methods for meeting the federal government's air quality standards that go into effect in 1975. These alternatives are being used in deliberations throughout the region and are serving as the basis for a San Diego transportation control plan submitted to EPA at the end of 1973. The plan was the first attempt in the nation to assess transportation control alternatives from the point of view of cost effectiveness.

Perhaps the most tangible proof of IREM's overall success is that it led to the creation of an Office of Environmental Management within the county government. Among other things this means that the staff positions originally funded by the Foundation's first grant have been incorporated into the county's regular budget. A second Foundation grant, in 1973, was confined to the further development of the city/county economic analysis model.

In Retrospect

FOUR YEARS AFTER the first of these experiments was funded, some interesting similarities have begun to emerge among them. For instance, the staffs of all of them have found that seeking a common ground among public officials, academics, and citizens to deal with problems of mutual concern has been a much slower process than anticipated.

Government representatives are vulnerable to changing political situations. They must find ways of balancing competing interests within their communities and of reconciling honest differences of opinion about the value of specific projects or general policies. Some businessmen and industrialists feel they are being asked to pay an undue share of the costs of long-standing environmental problems that had multiple causes. Academics are often impatient with what they feel to be government and citizen preoccupation with immediate issues to the neglect of long-range planning. Citizens are often frustrated at being “consulted” only after policies have been set and plans or projects are about to start or are already underway. Although the strength and number of citizen environmental groups vary from area to area, there are increasing signs that citizens want to be brought into discussions early on, to state their general environmental priorities, and to help set their communities’ environmental agendas, not simply to react to established proposals.

Despite such tensions, which will never disappear entirely, the environmental management teams have brought about broader cooperation among these disparate groups than existed previously. They have also stimulated the kind of cooperation among governmental agencies necessary to deal with environmental issues that cut across local jurisdictional boundaries.

One of the most complex challenges facing all the REM experiments is translating the results of technical planning and modeling into terms understood by various decision-making publics. What seems to be needed is a human analog of the compiler in computer systems—someone capable of putting the planners’ technical language into plain English, and also someone, or a group, to maintain liaison with the public to ensure that the planners are kept informed of the public’s concerns and priorities.

Among the principles that have emerged from the Foundation’s experience with the REM experiments are:

—building new interinstitutional relations, within local government and between the local group and large government bodies, can be very effective, but it is not enough. Some way must be found to tap the intellectual and research resources of local universities, whether on short-term or long-term bases, and to consult with a broad range of interests in the community at large, whether business and industrial groups or citizen environmental associations.

—a public information element should be an integral part of every environmental management effort. Unless citizens are kept informed and invited to participate, a project may be viewed as suspect at best and at worst as a conspiracy. Further, mechanisms must be found to enable citizens to state their views on large environmental issues before public policies, plans, or projects are fixed.

—any national environmental policy must take into account, and try to accommodate, the range of technical and economic resources in metropolitan areas. If policy is simply imposed from above it will cause confusion and possibly political explosions. Every effort should be made to adapt national policy to regional and local plans that are keyed to particular realities. At the same time, local policies and programs must connect with state and federal laws, regulations, and goals. Here again, interinstitutional cooperation, although difficult to achieve, is absolutely essential.

—the need for trained managers to deal with the range of environmental problems within government is large and growing. As government gets deeper into environmental law enforcement, management, and planning, it will need men and women with sophisticated skills and abilities. There are few such experts now. The REM experiments funded by the Foundation are providing excellent on-the-job training, but if efforts to control growth and development are to become an integral part of state and local governments, apprentices will no longer suffice. The Foundation in the next few years will be addressing itself to this new national need for trained environmental managers. According to Marshall Robinson, vice president and program officer in charge of the Foundation's Resources and the Environment program:

Governments of both rich and poor countries must find people who can interpret and administer natural resource policies and environmental protection programs on a broad scale, within the context of govern-

mental bureaucracies. Business needs managers who can work with the new constraints imposed by a world of growing resource shortages and environmental controls. The need for efficiency, for careful cost control, for new production and distribution processes, give business here and abroad a vital role in determining the conditions under which we will live; environmentally sensitive managers of business are as important as they are inevitable.

For over fifteen years the Foundation has...supported national educational institutions, multinational training programs, and research on management problems. Now we expect to draw on that experience to assist the training of government and business managers who can work with emerging resource and environmental problems. No one can say now whether a new managerial ethic will develop in response to the new environmental imperatives or whether the manager of the future will be merely a better informed version of today's managers, but whichever way it goes, we think the world will be better off if the education and development of its managers includes an ample, sophisticated knowledge of resource and environmental affairs.

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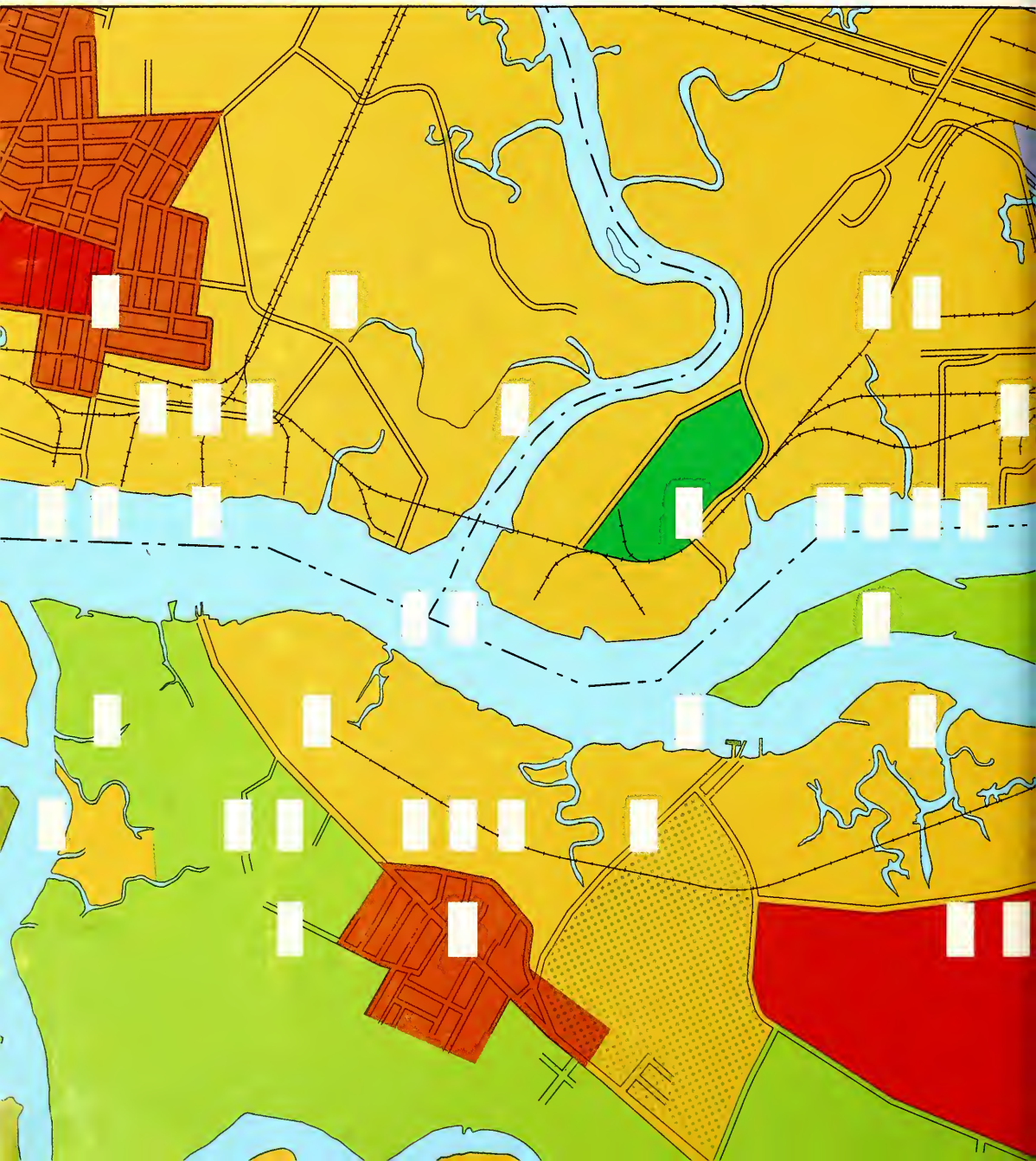
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